

Sec. 8.6 Factoring ax^2+bx+c

$$5x^2 + 11x + 2$$

$$(5x+1)(x+2)$$

$$5x^2 + 11x + 2$$

$$\begin{array}{l} 5 \cdot 2 \rightarrow \text{Mult. 1st + last} \\ 10 \rightarrow \text{Factor} \\ \boxed{1 \cdot 10} \\ 2 \cdot 5 \end{array}$$

$$\frac{5x^2}{1x} + \frac{1x}{1x} + \frac{10x}{2} + \frac{2}{2}$$

GROUPING

$$\begin{array}{l} 1x(5x+1) + 2(5x+1) \\ (5x+1)(x+2) \end{array}$$

$$5x^2 + 11x + 2$$

$$x^2 + 11x + 10 \quad \begin{array}{l} 1 \cdot 10 \\ 2 \cdot 5 \end{array}$$

$$\left(x + \frac{1}{5}\right)\left(x + \frac{10}{5}\right)$$

$$(5x+1)(x+2)$$

$$\begin{array}{l} 1 \cdot 6 \\ 2 \cdot 3 \\ \hline 6x^2 + 13x + 5 \end{array} \begin{array}{l} 1 \cdot 5 \\ 2 \cdot 5 \\ \hline \end{array}$$

$$(2x + 1)(3x + 5)$$

$$6x^2 + 13x + 5$$

$$\begin{array}{l} 6x^2 + 3x + 10x + 5 \\ \underline{3x} \quad \underline{3x} \quad \underline{10x} \quad \underline{5} \\ 3x(2x+1) + 5(2x+1) \\ (2x+1)(3x+5) \end{array}$$

$$\begin{array}{r} 30 \\ 1 \cdot 30 \\ 2 \cdot 15 \\ \hline 3 \cdot 10 \\ 5 \cdot 6 \end{array}$$

$$6x^2 + 13x + 5$$

$$x^2 + 13x + 30$$

$$(x + 3)(x + 10)$$

REDUCE!

$$\begin{array}{l} \frac{1}{2} \quad \frac{5}{3} \\ \curvearrowright \quad \curvearrowleft \end{array}$$

$$(2x+1)(3x+5)$$

$$3x^2 + 4x - 15 \begin{array}{l} 1 \cdot 15 \\ 3 \cdot 5 \end{array} \rightarrow x^2 + 4x - 15 \begin{array}{l} 1 \cdot 15 \\ 3 \cdot 5 \end{array}$$

$$(3x-5)(x+3)$$

$$(x-\frac{5}{3})(x+\frac{9}{3}) \frac{3}{1}$$

$$(3x-5)(x+3)$$

$$10x^2 + 31x - 14$$

$$x^2 + 31x - 140$$

$$(x - 4)(x + 35)$$

$$(x - \frac{2}{5})(x + \frac{7}{2})$$

$$\begin{array}{r} 1 \cdot 140 \\ 2 \cdot 70 \\ 4 \cdot 35 \\ \hline 35 \\ 4 \overline{) 140} \\ \underline{12} \\ 20 \end{array}$$

Sec. 8.7 Factoring Special Cases

a. $x^2 \underbrace{-12x}_{-6x \cdot 2} + 36$ ^{6·6} PS

$(x-6)(x-6)$ TWICE

$(x-6)^2$
-6x &

b. ^{PS} $4n^2 - 12n + 9$ ^{PS}

$(2n-3)^2$

Check $-6n \leftarrow$

c. $25x^2 \pm 40x + 16$

$(5x+4)^2$
 $20x$

$(5x+4)(5x+4)$
 $20x$

d. $64x^2 + 112x + 49$

$(8x+7)^2$
 $56x$

e. $16x^2 - 72x + 81$

$(4x-9)^2$
 $-36x$

$$a^2 \ominus b^2 = (a+b)(a-b) \quad \begin{matrix} 3 \\ \text{terms} \end{matrix} \Rightarrow (a+b)^2$$

$$a. \quad x^2 - 9 \rightarrow x^2 + 0x - 9 \quad \begin{matrix} 1 \cdot 9 \\ 3 \cdot 3 \end{matrix}$$
$$(x+3)(x-3)$$

$$b. \quad 25x^2 - 36$$
$$(5x+6)(5x-6)$$

$$c. \quad 16x^2 - 81$$
$$(4x+9)(4x-9)$$

Factor

$$49x^2 - 70x + 25$$

$$(7x - 5)^2$$

-35x -35x

Factor

$$x^2 + 7x - 70$$

$$\begin{array}{l} 1 \cdot 70 \\ 2 \cdot 35 \\ 5 \cdot 14 \\ -7 \cdot 10 \end{array}$$

not factorable

$$x^2 + 3x - 70$$

$$(x - 7)(x + 10)$$

QUIZ REVIEW 7.4-7.8

$$x^{\frac{1}{2}} = \sqrt{x} \quad \text{Radical form}$$

$$x^{\frac{3}{4}} = \sqrt[4]{x^3} \quad \text{OR} \quad \left(\sqrt[4]{x}\right)^3$$

$$\sqrt[7]{a^5} = a^{\frac{5}{7}}$$

$$\frac{x^{8-6}}{x^6} = x^2$$

$$\frac{x^7 y^4}{x^3 y^2} = x^4 y^2$$

$$\frac{8x^{4-3} y^{7-(-10)}}{2x^3 y^{-10}} = 4xy^{19}$$

$$\left(\frac{4}{7}\right)^2 = \frac{16}{49}$$

$$\frac{15x^{-2} y^5}{3x^5 y^3}$$

$$\frac{5x^{-2} y^5}{3x^5 y^3}$$

$$5x^{-7} y^2$$

$$5y^2$$

$$\frac{5y^2}{x^7}$$

$$\frac{2.8 \times 10^{-4} \cdot 10^{-2}}{7 \times 10^{-4}}$$

$$0.4 \times 10^{-2}$$

$$4 \times 10^{-1} \times 10^{-2}$$

$$4 \times 10^{-3}$$

$$\sqrt[4]{81} = 3$$

9 9
3 3 3 3

$$\sqrt{8x^2} = 2x\sqrt{2}$$

4 2 2 2
~~2 2~~

$$1, -6, 36, -216 \quad r = -6$$

$$49x^2 - 42x + 9$$

↓

$$(7x - 3)^2$$

-21x

$$49x^2 - 9 \rightarrow 49x^2 + 0x - 9$$
$$(7x + 3)(7x - 3)$$

$$\boxed{16x^2} - 40x \downarrow \boxed{+25}$$

$$(4x-5)(4x-5) = (4x-5)^2$$

$\underbrace{\hspace{10em}}_{-20x}$

$$64x^2 - 81$$

$$(8x+9)(8x-9)$$

$$100x^2 + \underline{60x} + 9$$

$$(10x+3)(10x+3) = (10x+3)^2$$

$\underbrace{\hspace{10em}}_{30x}$

$$\frac{50x^2}{2} - \frac{98}{2} = 2(25x^2 - 49)$$

$$2(5x+7)(5x-7)$$

Sec. 8.8 Factoring by Grouping

a. $\frac{8t^3}{2t^2} + \frac{14t^2}{2t^2} + \frac{20t}{5} + \frac{35}{5}$

$$2t^2(4t+7) + 5(4t+7)$$

$$(4t+7)(2t^2+5)$$

b. $\frac{15q^3}{5q^2} + \frac{40q^2}{5q^2} + \frac{3q+8}{1}$

$$5q^2(3q+8) + 1(3q+8)$$

$$(3q+8)(5q^2+1)$$

c. $\frac{6h^4}{3h} + \frac{9h^3}{3h} + \frac{12h^2}{3h} + \frac{18h}{3h}$

$$3h(2h^3 + 3h^2 + 4h + 6)$$

$$h^2(2h+3) + 2(2h+3)$$

$$3h(2h+3)(h^2+2)$$

d. $\frac{18h^3}{9h^2} + \frac{45h^2}{9h^2} - \frac{8h}{-4} - \frac{20}{-4}$

$$9h^2(2h+5) - 4(2h+5)$$

$$(2h+5)(9h^2-4)$$

Solve:

$$x^2 - 5x - 14 = 0 \quad \begin{array}{l} 1 \cdot 14 \\ \hline 2 \cdot -7 \end{array}$$

$$(x + 2)(x - 7) = 0$$

$$\begin{array}{r} x + 2 = 0 \\ -2 \quad -2 \\ \hline x = -2 \end{array} \quad \begin{array}{r} x - 7 = 0 \\ +7 \quad +7 \\ \hline x = 7 \end{array}$$